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What is cosmic radiation? Is it dangerous?

Asked by: George T.

Answer

Cosmic radiation is a collection of many different types of radiation from many different sources. When people speak simply of 'cosmic radiation' they are usually referring specifically to microwave background radiation. This consists of very, very low energy photons (energy in the range of 10^{-14} to 10^{-16} Joules) whose spectrum is peaked in the microwave region and which are remnants from the universe was only about 200,000 years old. There are also very old remnant neutrino radiation. Neutrinos pass through just about everything with no effect so they are harmless. Their energy is too low in energy to be dangerous.

On top of these there are higher energy particles that are being created constantly by stars in the universe. Photons of all different energies/wavelengths are being created by our sun, quasi-stellar objects, black-hole accretion disks, gamma-ray bursts and so on. These produce high-energy massive particles such as electrons, muons, protons and anti-protons. These energy particles are potentially dangerous, but most of these particles never make it to the earth. They are deflected by magnetic fields between us and the source, or they interact with other particles in flight.

The particles that do make it to the earth interact with our atmosphere, which acts as a shield. The high-energy cosmic rays bombard us all the time, but they interact quickly, producing much lower energy which impact the earth harmlessly. If this was dangerous to us, we would discuss these things! Some particles, like neutrinos and high energy muons, are passing the time, but they interact so weakly that they have no effect on our bodies. Of course, in space without the protection of our atmosphere then we would need some other type of radiation (spacesuits and protective covering on our spacecrafts).

The radiation to worry about, of course, is the 'cosmic' radiation produced by our sun. This type of cosmic radiation known to adversely affect us and that's UV radiation from our sun which causes skin cancer in millions of people every year. Again, our atmosphere serves as a shield which blocks the most harmful photons do make it through -- and without that protective ozone layer which blocks the most harmful photons all going to need a lot more sunscreen!

Answered by: Brent Nelson, M.A. Physics, Ph.D. Student, UC Berkeley

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